Preliminary Science Flight Report
Operation IceBridge Arctic 2011

Flight: **F32**
Mission: **Devon Ice Cap - CryoVEx**

Flight Report Summary

Aircraft	**P-3B (N426NA)**
Flight Number	032
Flight Request	11P006
Date	Thursday, May 5, 2011 (Z)
Purpose of Flight	Mission Devon Ice Cap – CryoVEx
Take off time	13:52 Zulu from Thule Air Base (BGTL)
Landing time	18:05 Zulu at Thule Air Base (BGTL)
Flight Hours	4.5 hours.
Aircraft Status	Airworthy.
Sensor Status	All installed sensors operational.
Significant Issues	None
Accomplishments	• Low-altitude survey (1,500 ft AGL) of several lines across the Devon Ice Cap and Bylot Island for ESA's CryoVEx campaign and comparison with ground data. • ATM, MCoRDS, accumulation, snow and Ku-band radars, gravimeter, magnetometer, POS/AV, and DMS were operated on the survey lines.
Geographic Keywords	Devon Ice Cap, Devon Island, Bylot Island.
ICESat/CryoSat Track	CryoSat Orbits from April 20th and May 1st.
Repeat Mission	2004

Science Data Report Summary

Instrument	Instrument Operational			Data Volume	Instrument Issues
	Survey Area	Entire Flight	High-alt. Transit		
ATM	☑	☒	☒	24 GB	None
MCoRDS	☑	☒	☒	0.9 TB	None.
Snow Radar	☑	☒	☒	114 GB	Drive failure
Ku-band Radar	☑	☒	☒	114 GB	None
Accumulation Radar	☑	☒	☒	120 GB	None
DMS	☑	☒	☒	27 GB	None
POS/AV	☑	☑	☑	2 GB	None
Gravimeter	☑	☑	☑	640 MB	None
Magnetometer	☑	☑	☑	480 MB	None

Mission Report (Michael Studinger, Mission Scientist)

Only the targets on the east side of Greenland showed good weather today but these areas require a 7.5 h flight to be surveyed efficiently. We had only a 5 hour window to work with and decided to fly the Devon Ice Cap mission despite some clouds in the area. We had to drop the Barnes Ice Cap from the mission plan because of time restriction, but were able add the April 20th CryoSat orbit to the mission and two glacier runs over Bylot Island. The weather forecast for the Barnes Ice Cap was poor and we will attempt to fly it another day. We encountered more clouds over the Devon Ice Cap than expected from the forecast and had to change flight elevation occasionally. We were able to survey the critical parts at 1,500 ft AGL and got good data. A phone call with the CryoVEx field party shortly before takeoff confirmed good conditions at least over the Summit Camp on the Devon Ice Cap. We flew over the camp (and the corner reflectors) several times. Conditions changed quickly. On the last flight we could barely see the camp. The goals of the CryoVEx experiment on Devon Island are to assess the accuracy of surface elevations derived from CryoSat-2 L2 data; to assess the potential for CryoSat-2 data to be used for mapping snow accumulation over ice caps across the Queen Elizabeth Islands and to relate CryoSat-2 waveforms to surface and near-surface conditions on the ice cap. In order to do this it is necessary to continue measurements along the original CryoSat cal/val transect (ASIRAS Line 623) to maintain long-term thickness changes measurements that began in 2004. The ATM lasers got 75% surface returns over the Devon Ice Cap and 90% over the two glaciers on Bylot Island. The snow, Ku-band and accumulation radars lost some data due to altitude changes necessary due to a loss of forward visibility. With today's flight IceBridge has completed all 3 missions of the joint experiment with ESA's CryoVEx teams.

Individual instrument reports from experimenters on board the aircraft:

ATM: worked very well.

MCoRDS: worked well.

Snow and Ku-band radar: The snow and Ku-band radars worked well. Problems with drive.

Accumulation radar: worked well.

Gravimeter: Worked well. No issues.

Magnetometer: worked well.

DMS: worked very well.

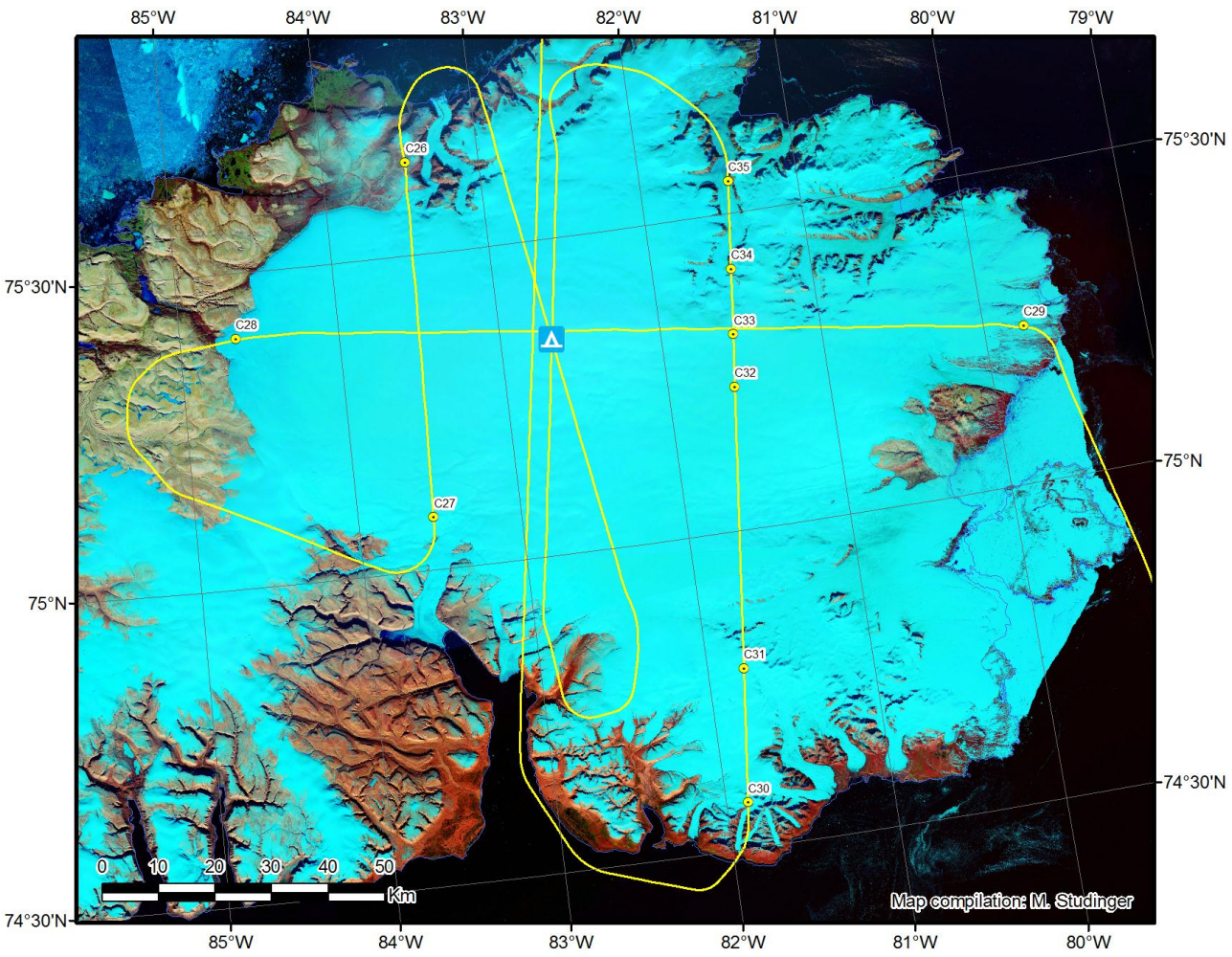

Figure 1: P-3 trajectory of today's flight over the Devon Ice Cap. The location of the CryoVEx Summit Camp is indicated by the camp ground symbol.

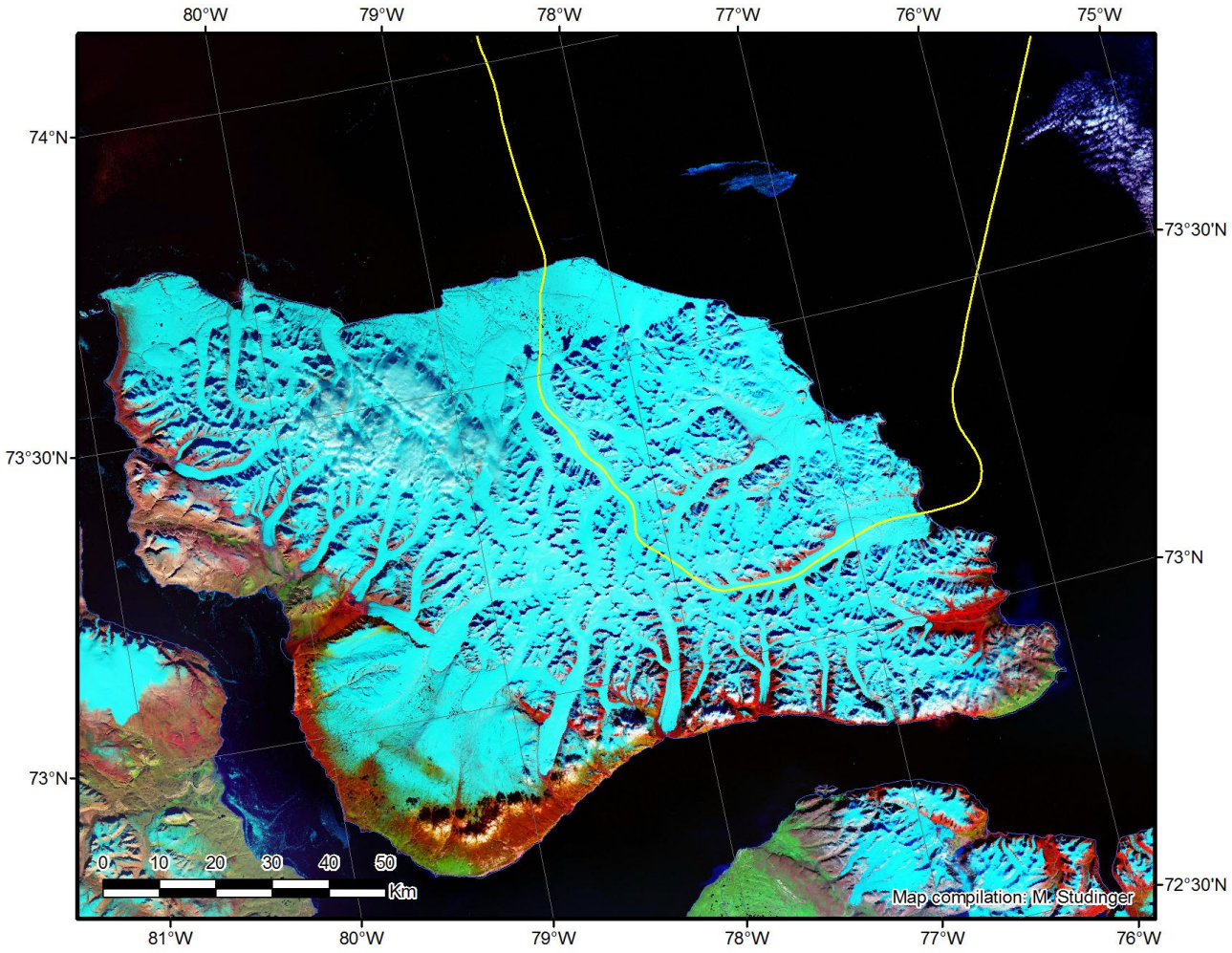

Figure 2: P-3 trajectory of today's flight over Bylot Island.

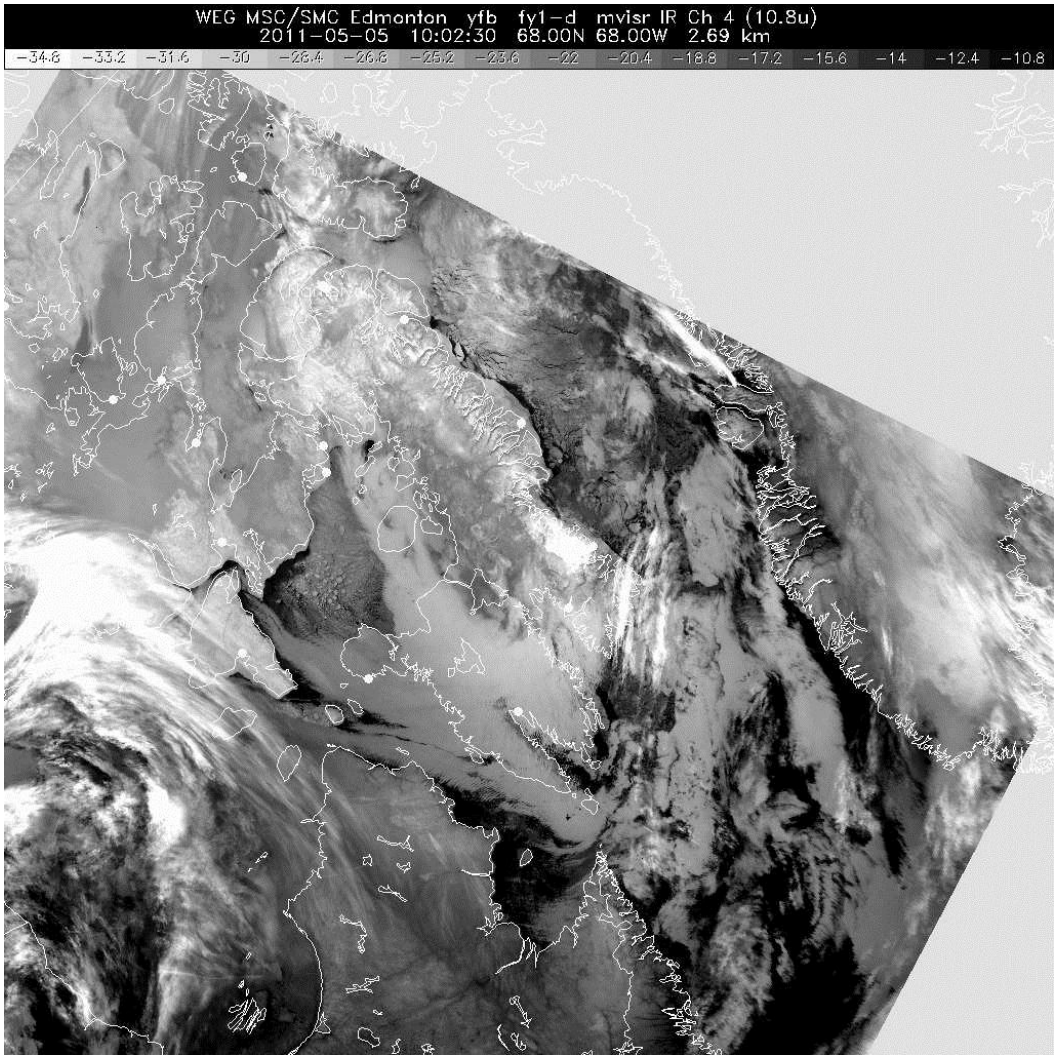

Figure 3: IR satellite image downloaded shortly before takeoff showing clouds over the survey areas.